

Introducing the Endowment-Practice-Institutions (EPI) framework for studying agency in the institutional contestation of socio-technical regimes



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ABSTRACT

A timely transition of socio-technical systems to more sustainable alternatives is crucial in mitigating climate change and other environmental problems. While innovation plays a significant role in such transitions, policy makers and the scientific community have become increasingly aware that the deliberate destabilization of existing socio-technical regimes—including associated institutions and technologies—is also often necessary. However, such aspiration is politically contested. This paper presents the Endowment-Practice-Institutions (EPI) Framework to study the contestation of institutions underpinning socio-technical regimes. By integrating key theories from Institutional Sociology and Political Economy, the framework conceives actors' capability of influencing institutional structures to be dependent on their institutional work practices and the various endowments that enable these practices. We present Japanese coal policy as an example to illustrate how the framework can be used to assess actors' institutional work and their influence on institutional outcomes. In addition to providing new theoretical insights, the framework helps to systematically analyze agency-driven mechanisms pertinent for the maintenance or destabilization of socio-technical regimes.

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1. Introduction

In order to overcome current environmental challenges and their socio-economic consequences, socio-technical systems such as energy and transportation need to transition to more sustainable alternatives. These systems consist of technical, economic, and socio-political elements (e.g., user practices, regulations, and norms) that are closely interrelated. Therefore, the transitions of these systems require coordinated changes along these dimensions. For these changes to materialize, however, it is not sufficient to consider only innovations and changes of production and consumption patterns; one must also fathom how to break off unsustainable incumbent technologies and practices (Rosenbloom and Rinscheid, 2020; Turnheim and Geels, 2012). In other words, while innovations create alternatives for existing socio-technical

regimes, these alone do not necessarily lead to their overthrowal.

Socio-technical *regimes*, consisting of formal and informal rules governing the interaction of technologies and actor networks, are characterized by inertia and hence tend to prevent radical changes in socio-technical systems (Fuenfschilling and Truffer, 2014; Geels, 2004, 2011). In the energy sector, for instance, centralized energy production based on fossil fuels (coal, natural gas, oil) still constitutes the dominant regime in many countries. These configurations dominate over long periods of time, creating lock-ins and path dependencies. Furthermore, considering the long lifetime of energy infrastructures (e.g., power plants) and the interests of incumbent actors vested in them, new technologies face a big inertia. As incumbent technologies and their institutional backbones co-evolve over time, institutions can be a critical barrier to the uptake of innovations (Unruh, 2000). Moreover, incumbents do not act as cumbersome guards passively waiting to be overthrown. Owing to vested interests, they are not only reactive but often proactive in defending their field against technological and institutional pressure, thereby resisting or slowing down transition efforts (Geels, 2014; Hess, 2016; Penna and Geels, 2015; Turnheim

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and Geels, 2012). One example of how destabilizing forces are absorbed is by integrating novel elements to their operations through processes such as *creative accumulation* (Bergek et al., 2013; Kivimaa and Kern, 2016). However, some incumbents may also contribute to the development of innovations at the level of technological niches, thereby putting pressure on the established regime that they are part of (Berggren et al., 2015; Mazzucato, 2013). With the cognizance that the practices of incumbent organizations are not as monolithic as previously assumed, recent perspectives have called for a more nuanced understanding of incumbency in transition efforts (Turnheim and Sovacool, 2019).

Although recent insights reveal the multiplicity of incumbents' reactions in sustainability transitions, structured knowledge about how actors actively defend or destabilize a regime is still lacking¹ (Davidson, 2019; Rogge and Johnstone, 2017). Regime destabilization has gained salience in the transitions literature (e.g., Leipprand and Flachsland, 2018; Roberts, 2017; Rogge and Johnstone, 2017), yet the primary focus of existing studies tends to remain at a macroscopic level, such as analyses of historical patterns (e.g., Turnheim and Geels, 2012; Kungl and Geels, 2018) and analyses from policy-mix perspectives (Kivimaa and Kern, 2016). A recent meta-analysis by Martínez-Arranz (2017) found that carbon pricing, renewable subsidies, and ideologies such as privatization and liberalization are the most prominent destabilization factors in the energy supply sector. While these studies reveal the conditions, factors, or policies that may be pertinent for regime destabilization or persistence, the question of what practices are required for realization of these conditions and how these may vary with context remain largely unanswered. We argue that it is also important to address explicitly the vehicle (used by specific actors) that seeks to bring about or hinder the change. This *agency* in the context of regime destabilization and maintenance has received limited attention so far. Such a shortcoming is somewhat striking considering that socio-technical transitions are conceived as a shift from one regime to another (Fuenfschilling and Binz, 2018; Fuenfschilling and Truffer, 2014; Geels, 2005). Furthermore, in the case of *sustainability transitions*, the regime change additionally bears a normative orientation, namely, toward more sustainable alternatives. Hence, the role of agency and the purposeful transformation of socio-technical systems deserves further investigation both theoretically and empirically.

Since regimes represent the dominant institutional rationalities in a field (Fuenfschilling and Binz, 2018), understanding the struggle around their transformation requires an analysis of the processes that shape, reproduce, and potentially disrupt institutions. While taking into account the long-term structural factors that determine institutional trajectories, we contend that agency and power relations among actors in an institutional field are decisive in explaining institutional outcomes (Rinscheid et al., 2019). Hence, to explain institutional outcomes, we need to determine not only who the influential actors are but also what makes them more influential. In order to analyze how actors shape institutional structures that underpin socio-technical regimes and why some are more influential than others, we develop the Endowment-Practice-Institutions (EPI) Framework. The framework draws on complementary insights from Institutional Sociology and Political Economy literatures that emphasize actors' practices and endowments, respectively. While bringing these two related yet so far separate strands of literature closer, we also introduce new concepts and causal linkages in an effort to deepen the theoretical understanding. In addition to making theoretical contributions, the

framework also facilitates to systematically study agency in institutional contestations, for instance in the context of the struggle for the maintenance or destabilization of socio-technical regimes and their outcomes.

The structure of the paper is as follows: In the next section we introduce insights from new institutionalism including institutional work and institutional entrepreneurship that address the purposive actions for shaping institutional structures. In Section 3 we focus on Political Economy perspectives which emphasize actors' endowments for the formation of influence. In both of these sections, we also highlight the shortcomings of the respective literature and how they can be complementary. In section 4 we present the EPI Framework which integrates Institutional Sociology and Political Economy perspectives and establishes new concepts and causal links. We then apply the framework in section 5 to the case of Japanese coal power to demonstrate its heuristic value in understanding of how agency accounts for the persistence of the coal regime in Japan so far. Finally, Section 6 highlights the contributions of the framework and exemplifies the research problems it can be applied to.

2. Institutional change and the role of agency in destabilization processes

Institutions are conceptualized as formal and informal rules that condition actors' and organizations' behaviors and their relations with others (Scott, 2008). Formal institutions comprise the regulative structures; specifically, the laws and policies that structure actors' behaviors in a given socio-technical system through monitoring and (the threat of) sanctioning. Informal institutions comprise normative and cognitive structures. Cognitive structures refer to shared beliefs and expectations of how others will act, while normative structures comprise shared values and norms guiding legitimate behaviors in socio-economic contexts. Taken together, institutions, consisting of regulative, normative, and cognitive structures, can be considered as backbones of socio-technical regimes that enable durable configurations of actors and technological elements. Considering that they also provide stability and legitimacy to regimes, a change of institutions can be decisive for the destabilization of a regime.

The role of actors in institutional change gained broad attention in some strands of Sociology and Organizational Studies and the Management literature. In particular, different variants of *new institutionalism* and *organizational institutionalism* have examined the role of agency. Such efforts have recently resurrected the focus on the relation among agency, politics, and institutional change (Wooten and Hoffman, 2017), which Suddaby et al. (2013) state has its origins in 'old' institutionalism (i.e., Selznick, 1949). In response to the overwhelming focus on institutions' constraining forces on actors (i.e., isomorphic pressure), *new institutionalism* has extended the scope of research by focusing on how actors in turn affect institutions despite being subject to their structural constraints—a phenomenon called *embedded agency* (Garud et al., 2007; Sewell, 1992). Despite being embedded in institutions, actors who manage to change institutional arrangements by strategizing actions and skillfully mobilizing resources are denoted as *institutional entrepreneurs* (D. Levy and Scully, 2007; Maguire and Hardy, 2006). Incoherencies and crises within an institutional field, as well as external shocks such as social upheaval, natural disasters, and technological disruptions, are claimed to favor institutional entrepreneurs because actors can frame their path-breaking novelties as solutions to the actual problems faced (Hardy and Maguire, 2017). However, for actors to take advantage of such instances, these irregularities should also be interpreted as a problem by other actors. Therefore, the agency of institutional entrepreneurs is necessary to

¹ Here, destabilization refers to a "change that affects the regime's core structures, potentially breaking a lock-in" (Martínez Arranz, 2017, p. 127).

problematize issues, theorize solutions to those problems, and thereby legitimize their interventions (Munir, 2005). Although such an act requires actors to mobilize their resources and provide new issue frames or meanings to initiate a collective action, the literature remains vague on what resources enable institutional entrepreneurship (Hardy and Maguire, 2017).

Drawing on the insights from institutional entrepreneurship, *institutional work* presents a more refined approach to the study of agency in the context of institutional change. The majority of the institutional entrepreneurship literature narrowly focuses on successful actors. By contrast, the concept of institutional work broadens the scope by adopting a *practice* turn. This step shifts the focus from the eventuated, accomplished acts to any purposeful attempt that may have failed or succeeded in shaping institutions (Lawrence and Leca, 2009). As a result, the set of actors subject to analysis is broader than the few successful ones. On the basis of their review of empirical studies, Lawrence and Suddaby (2006), in their seminal paper, identified 17 distinct forms of institutional work practices and classified them according to three objectives: creating, maintaining, and disrupting institutions. While practices pertinent for creating institutions target reconfigurations of belief systems, rules, and property rights, maintaining activities include the reproduction of norms and belief systems and the enforcement of compliance with existing rules. The least researched practices are those that disrupt institutions (Lawrence and Suddaby, 2006). These are composed of practices striving to detach sanctions and reward mechanisms associated with the existing configurations of rules, technologies, and routines. These refinements account for a broader understanding of agency as the focus lies not only on successful actors or the creation of institutions but also on counter-actors, such as maintaining institutions or further disrupting acts.

However, some major caveats remain to be addressed. As mentioned earlier, neither the institutional entrepreneurship nor the institutional work literature provides a compelling account of the actor-level factors enabling institutional work. In other words, questions of what resources are required, how these requirements change for different forms of institutional work, and why some actors create a higher impact on institutions are yet to be answered. Furthermore, the institutional work approach has so far neglected the influence of institutions, resulting in a similar actor conception as institutional entrepreneurs who are portrayed as institutionally disembedded, heroic agents. However, institutional settings can have a large impact on what forms of institutional work gain higher leverage and legitimacy as well as on how resources are distributed among actors. In essence, additional attention needs to be paid to the recursive interplay between actors and institutions to provide a more accurate view of embedded agency. In the next section, we explore how analytical frameworks from Political Economy can be used to help close some of these research gaps.

3. Political Economy perspectives on the policy goal attainment of actors

While Institutional Sociology has provided detailed causal mechanisms between actors' practices and socio-technical regime transitions, Political Economy has so far approached this link in a substantially reduced manner. The literature often treats a country's adoption of policies (i.e., formal institutions) as a consequence (or 'equilibrium') of explicit and implicit bargaining among the policy proposer and the domestic actors that have politico-economic stakes in the resulting policy (often referred to as stakeholders) (Dai, 2005; Grødem and Hippe, 2019; Helpman and Persson, 2001). Therefore, key questions boil down to which actors are more successful in attaining their policy goals (i.e., which

actors possess greater bargaining power that brings the final policy closer to their ideal points). Without worrying a great deal about the structure of these exchanges, these studies focus more on identifying the resource endowments that define the bargaining power of actors and help attain their policy goals.

The literature acknowledges approximately four categories of relevant resource endowments held by actors: financial assets, organizational capacity, conflict capacity, and networks. A popular perception of lobbying is a resource exchange between stakeholders and policy makers (Stigler, 1971). In this view, actors mobilize *financial assets* either directly as financial support for policy proposers (Hillman and Hitt, 1999) or indirectly as provision of knowledge and human resources for policy makers (Binderkrantz and Pedersen, 2016; Hall and Deardorff, 2006). The second category, *organizational capacity*, includes various organizational characteristics. These play a vital role especially when actors aim to mobilize material resources to overcome a collective action problem in representing their group interests (Offe and Wiesenthal, 1980). By characteristics, we do not only consider aspects such as size but also membership type (Dür, 2008). Next, *conflict capacity* measures to what extent actors can create (re) electoral pressure for vote-seeking politicians (Korpi, 1985; Offe, 2003). In particular, indicators of private sector profitability (e.g., employment and personal income) are known to influence electoral outcomes (Levy and Egan, 1998, p. 342). Finally, actors do not tend to act in isolation; *network relations* affect policy goal attainment, too (Hacker and Pierson, 2014; Varone et al., 2016; Walker and Rea, 2014). The position of an actor within a network of all the relevant actors shapes how effectively monetary and other endowments can be converted into influence and how an actor's policy influence can be affected (indirectly) by the endowments of other connected actors. Baumgartner, Larsen-Price, Leech, and Rutledge (2011) and Box-Steffensmeier et al. (2013) provide empirical evidence for the disproportionate influence of well-connected stakeholders on political outcomes.

However, the current Political Economy literature on lobbying and policy influence tends to remain vague about the causal mechanisms through which the endowments of actors are linked to their influence on institutions. One notable study is Binderkrantz' (2008) detailed investigation of Danish interest groups, which links interest group types to the type of lobbying activities undertaken. Here, the rationale behind the group classification touches upon the organizations' resources, resulting in "groups with corporative resources," "public interest groups," and "other groups." Although the main proposition of our framework is to capture more detailed resource endowments as sources of actors' practices, the work by Binderkrantz (2008) comes closest to our research interest in the realm of Political Economy. Interestingly, taken together, Political Economy approaches identify actor-specific endowments that enable institutional work proposed in Sociology, while the institutional work literature offers potential causal mechanisms that link actor-specific characteristics to success in policy goal attainment by elucidating the relevant practices that map onto both.

4. The Endowment-Practice-Institutions (EPI) framework

By drawing on these complementary insights, we develop a conceptual framework that elucidates how agency shapes institutional foundations of socio-technical regimes and why some actors are more influential than others in this endeavor (Fig. 1). We conceive of *agency* as actors' capability to shape institutions through institutional work practices. Thereby, some actors exert more influence on institutional arrangements than others. We posit this influence to be dependent on the effectiveness of an actor's

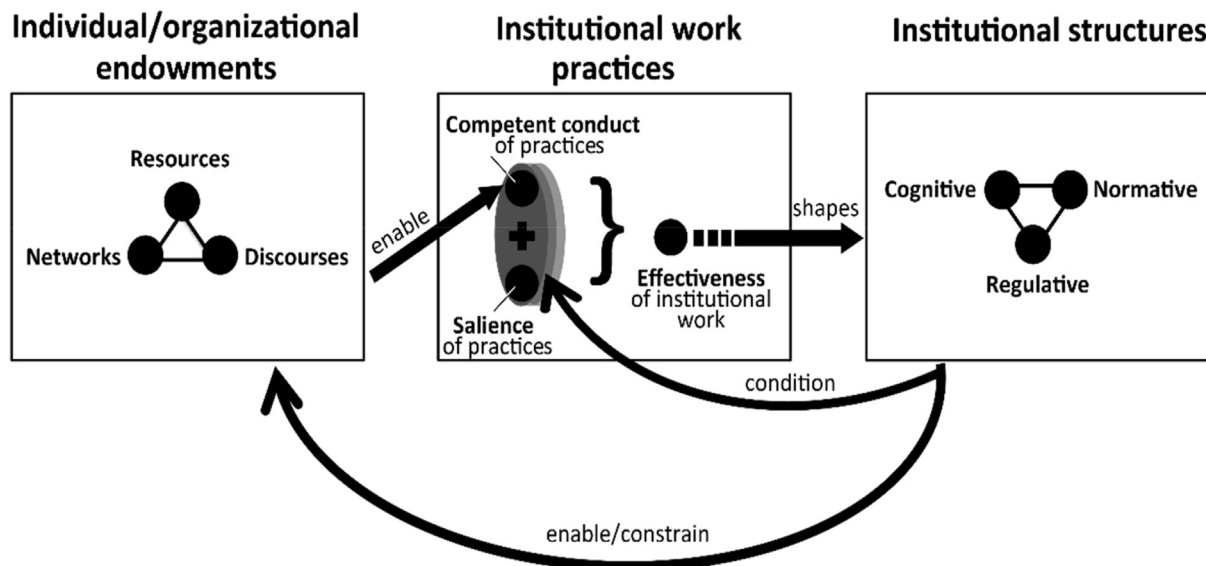


Fig. 1. Illustration of the recursive interplay among actors' endowments, institutional work practices, and institutional structures in the EPI framework. The influence of an actor on institutions is conceived to be determined by the relative effectiveness of their institutional work vis-à-vis other actors. This comprises the joint effect of multiple practices which depend on the salience of practices, how competently these are conducted and the contingencies among practices. While the salience of a practice is conditioned by institutional structures, competent conduct of practices is enabled by the mobilization of endowments required for that practice. Actors' access to endowments can be enabled or constrained by institutional structures.

institutional work, which comprises the joint effect of multiple practices performed. Depending on the contingencies among those practices and the order in which they are conducted, this joint effect can be of synergistic or antagonistic nature (Section 4.3). Breaking it down further, we theorize the effect of any given practice to be contingent on two factors: its salience for that specific institutional setting at stake (Section 4.1), and how competently it is performed (Section 4.2). The former is conditioned directly by the institutional context,² whereas the latter is a factor of the actors' endowments. These relations are depicted below in Fig. 1. The following sub-sections elaborate on the key constructs of our framework.

4.1. Salience of an institutional work practice

Previous work in Institutional Sociology has paid scant attention to what makes an institutional work practice salient in a specific context. In other words, there is inadequate theorization on how the importance of practices changes with context. We define *salience* as the congruence between the conduct of a given institutional work practice and the ultimate objective an actor has with respect to institutional outcomes. The salience of an institutional work practice can be considered as a gradual concept, that is, a given practice will be salient to a certain degree. We conceive the salience of different institutional work practices to be contingent on the following factors: i) objectives of actors with respect to institutional outcomes; ii) types of institutions targeted; iii) issue characteristics; and iv) the broader institutional or political setting, such as political opportunity structures that actors are embedded in.

We first start by explaining how objectives determine the salience of practices. Actors' objectives with respect to institutional

outcomes can be classified into three broad categories: creating, disrupting, and maintaining institutions (Lawrence and Suddaby, 2006). According to their review of empirical research, Lawrence and Suddaby (2006) identified several practices that they refer to as different forms of institutional work associated with each of the three objectives. Taking this insight a step further, we posit that in a given situation of institutional contestation and depending on actors' objectives, different institutional work practices might gain higher salience. For instance, a salient practice for maintaining institutions is *mythologizing* which refers to the activity of creating myths to preserve the normative underpinnings of existing institutions. For example, as a way to maintain the existing regime, "corporate environmentalism" promotes the idea that in order to solve environmental problems, companies should be part of the solution and develop technological innovations (Wright and Nyberg, 2014). Another salient practice for maintenance can be *policing*, which ensures compliance through enforcement, auditing, and monitoring. On the other hand, actors seeking to disrupt institutions tend to employ strategies targeted at *undermining assumptions and beliefs* concerning a practice or a technology. Concerning the creation of an institution, *theorizing*, which is the act of defining new categories and developing chains of cause and effect, can be salient. For instance, the precautionary principle adopted by the European Union in 1992 was developed to justify taking regulatory action against potential risks in situations with a "serious suspicion of danger" (van Asselt and Vos, 2006).

The salience of practices also varies depending on the types of institutions targeted. Corresponding to the regulative, normative, and cognitive pillars of institutions, institutional work practices are associated with rules, norms, and meaning systems, respectively. (Guillemette et al., 2017; Zvolksa et al., 2019). Along these lines, *theorizing* is associated with the cognitive, *mythologizing* with the normative, and *policing* with the regulative dimension (Guillemette et al., 2017). Concerning the adoption of destabilization policies (e.g., policies to phase-out fossil fuels), institutional work practices on the regulative dimension can be expected to be of primary importance. However, institutional work targeting the normative and cognitive dimensions might be just as relevant for creating

² Salience of a given practice can also depend on the actor's previous practices as well as the adversaries' practices that could necessitate counteractions. For the sake of simplicity, these aspects are not explicitly included in the theorization. However, researchers should also be attentive to them when assessing the practices and institutional work of actors in a full-fledged empirical analysis.

legitimacy for subsequent changes in rules.

Issue characteristics also determine what practices gain more salience. For instance, a debate on extending a smoking ban in public places might primarily draw on institutional work targeting normative associations. Proponents of a more restrictive ban could underline the moral foundations of protecting non-smokers from exposure to harmful substances. Likewise, a contestation around open-access publication in academia might revolve around normative and cognitive dimensions. By contrast, in addition to normative and cognitive aspects, transitions of socio-technical systems, such as low-carbon transitions, also involve material and technological elements, which have implications for the relevance of different institutional work practices. For instance, actors representing the fossil fuel regime might seek to implement cleaner production technologies, such as carbon capture and storage (CCS), to appease environmental concerns over carbon emissions. These technical innovations in turn can lay the groundwork for institutional work activities, such as *undermining of assumptions and beliefs* about the climate impact of fossil fuel use or the reliability of renewable-based energy systems.

Finally, the broader institutional structures, including governance arrangements (Hinings et al., 2017) or political culture, can also influence what practices become salient (Schlager, 2007). In this respect, the degree of consensus needed to enact changes and the openness of a political system (i.e., the number and accessibility of channels through which societal actors can articulate their interests) matter. As a recent study shows, stakeholders' discursive abilities were neither necessary nor sufficient in explaining their influence on formal institutions in Swiss waste management, an outcome that may be due to the specific arrangements of the consultation process (Duygan et al., 2021). In particular, parliamentary and civil society involvement was limited and the process was led by a single federal agency. In such a closed setting, covert forms of institutional work, such as lobbying, may be especially prominent (see also Culpepper (2011)).

Overall, the salience of institutional work practices depends on several factors and is context dependent. We argue that actors conducting salient practices gain advantage. However, in addition to strategizing the right course of action, performing them competently is also crucial. Next, we elaborate on the endowments that actors need to possess for the conduct of these institutional work practices.

4.2. Competent conduct of institutional work practices

We argue that along with salience, practices need to be conducted competently to create an effect. For a competent conduct of practices, actors need to possess and skillfully mobilize the endowments required for that practice. While the institutional work literature has focused on actors' practices to shape institutions, inadequate attention has been paid to what enables these practices at the individual or organizational level. In Section 3 we presented a rough categorization of endowments that can be deduced from the Political Economy literature. Although these endowments are relevant for policy goal attainment, they are not directly related to institutional work practices. Therefore, we adopt the conceptualization of Duygan et al. (2019) in this framework. By referring to the institutional work and institutional entrepreneurship literature, the authors deduced actors' *resources*, *networks*, and *discourses* as three broad categories of endowments that enable institutional work practices (Table 1). Next, we introduce these different categories of endowments and elaborate on their link with different types of practices.

The first category, resources, can be classified into material and non-material resources. Material resources encompass technical

artefacts, such as technology, infrastructure, and raw materials owned by certain actors, as well as financial assets, such as capital funds and monetary stocks. Non-material resources refer to knowledge and expertise in political, technical, and judicial realms that may be critical for practices such as suasion or litigation. The second category, networks, refers to the relational ties of actors. These can be essential in gathering new information or gaining access to resources or decision venues. Actors can also use their position in networks to create dependencies and leverage their status. Finally, actors convey their ideas and preferences in the form of narratives or frames. The ensuing discourses from one's constant interaction with others influence collective sense-making and opinion formation, which make discursive elements an important means of agency. This conceptualization is also well aligned with insights from the Political Economy and Organizational Institutionalism literatures. Additional information on this overlap is provided in the Appendix.

Depending on the form of institutional work, the required set of endowments varies. Drawing from the original descriptions provided by Lawrence and Suddaby (2006), Duygan et al. (2019) proposed a first link between institutional work practices and the set of endowments relevant for these practices. For example, actors need to be proficient in shaping discourses in order to undermine assumptions and beliefs surrounding the coal industry's claims with respect to employment provision. On the other hand, to safeguard the standards benefiting the coal industry, incumbents who use a policing form of institutional work might rely heavily on their financial resources and judicial expertise along with their ties to strategic actors in networks. Furthermore, some forms of institutional work might be more demanding than others. For example, to conduct a successful advocacy, "the mobilization of political and regulatory support through direct and deliberate techniques of social suasion" (Lawrence and Suddaby, 2006, p. 221), actors might need to rely on all three group of endowments: resources, networks, and discourses. In other cases – say when actors aim at changing normative associations, defined as the "re-making [of] the connections between sets of practices and the moral and cultural foundations for those practices" (Lawrence and Suddaby, 2006, p. 221) – one type of endowments (here: discourses) might matter more than others. However, even when an institutional work practice may depend primarily on a single category, such as resources, an actor's position in networks might play an indirect yet also important role for obtaining those critical resources. In that sense, the three categories are complementary yet not entirely independent from one another. However, such interdependencies are not of concern for our framework because its focus is on the endowments that are required and not on mechanisms of how they are attained. Nevertheless, we assert that the institutional-political setting also conditions the distribution of endowments among actors (Berry, 1989; Haller, 2007; Leach et al., 1999).

4.3. Contingencies and time-ordering of institutional work practices

Hitherto, we have discussed what determines the effect of a given practice. However, actors' institutional work often consists of multiple practices conducted simultaneously or sequentially. The joint effect of these practices depends on the contingencies and time-ordering of how these practices are performed. Although the importance of temporal sequence in institutional work practices is scarcely researched, some empirical findings suggest that it may be relevant. For example, the institutional work practices carried out for a successful legitimization of potable water reuse in California showed a certain trend with different stages of the innovation system, such that the work on cognitive institutions like *theorizing* or *creation of normative networks* preceded the *advocacy* or political

Table 1
Categorization of endowments conducive for institutional work practices.

Resources	Material resources: financial assets, technological artefacts, infrastructure
	Non-material resources: intellectual assets, political knowledge, judicial expertise
Networks	Actors' relational ties and position in social networks (e.g., information exchange, collaboration)
Discourse	Narratives or frames generated to influence collective meaning systems and public opinion.

Table 2
Postulates of the framework.

Postulate 1	The influence of actors on institutional structures is based on the effectiveness of their institutional work.
Postulate 2	The effectiveness of actors' institutional work consists of the joint effect of their practices, which—depending on their interaction and the order in which they are conducted—can be of antagonistic or synergistic nature.
Postulate 3	The effect of a given practice is contingent on its salience and how competently it is conducted.
Postulate 4	The salience of an institutional work practice depends on several contextual factors, such as actors' objective with institutional outcomes (i.e., maintaining, disrupting), type of institutions targeted, issue characteristics, and broader institutional arrangements.
Postulate 5	The competent conduct of an institutional work practice is dependent on the possession and skillful mobilization of endowments required for that practice.
Postulate 6	The three main categories of endowments conducive for the conduct of institutional work practices are actors' resources, networks, and discourses.

work that followed later (Binz et al., 2016). Despite having taken all the right steps, Uber had failed to change the Dutch taxi law due to incoherencies resulting from the launch of all their actions simultaneously. This contrasts with a build-up logic that would have required framing and theorizing to proceed and create a basis for cognitive and moral legitimacy for the succeeding actions targeting regulative institutions through negotiation or lobbying (Pelzer et al., 2019). These findings echo the view that the institutionalization of change occurs over time through the cumulative effect of institutional work practices (Perkmann and Spicer, 2008). As a result, we posit the effectiveness of actors' institutional work to be dependent not only on the effect of single practices but also on the joint effect, which may be subject to interactions among practices. For instance, the insights from the aforementioned studies hint that simultaneous work on different pillars of institutions can be counteracting, leading to backlashes, whereas the precedence of work on cognitive and normative pillars can form a stronger foundation for the legitimacy of the succeeding work on regulative institutions.

The causal relations theorized in our framework among actors' endowments, institutional work practices and institutional structures can be defined through several postulates as listed below in Table 2. These postulates represent the key assumptions or principles upon which our framework is predicated.

From some of these postulates, a specific set of hypotheses can be formulated for further empirical research. For instance, based on Postulate 4, the political leverage gained from practices can be hypothesized to vary with the characteristics of political systems. In open political systems where a broader set of actors and representatives of civil society have access to policy-making, the impact of institutional work practices aiming at normative pillars can be expected to be larger than in closed political systems. Or based on Postulate 6, the relative importance of each category of endowment for different institutional work practices can be investigated. In the next section, we confront these theoretical perspectives with the particularities of coal power in Japan to illustrate how the framework can be used to identify effective forms of institutional work in a given empirical setting and thus serve as a heuristic tool to assess actors' strategies.

5. Illustrative empirical example: Coal power in Japan

We first provide background information on energy policy-making in Japan in section 5.1. We then apply our framework to derive schemes of institutional work pertinent for the destabilization and maintenance of Japan's coal regime (section 5.2). In section 5.3, we contrast this framework with the actual strategies and practices of actors to interpret how Japan's coal regime is able to sustain itself despite some unfavorable contextual conditions, such as the lack of domestic coal reserves. Note that our aim in this section is not to present a full-fledged empirical analysis, which is beyond the scope of this paper, but to demonstrate the heuristic value of the framework in explaining the institutional outcomes leading to the continuation or destabilization of regimes. For that purpose, we revisit the case of coal power in Japan and interpret the insights derived from previous studies such as Trencher et al. (2019, 2020) in light of our framework to unravel the role of agency in the perpetuation of coal power in Japan.

5.1. Background: Energy policy in Japan

Despite lacking local reserves, Japan is the only G7 country building new coal-fired power plants. As of 2019, coal accounts for 28% of Japan's electricity generation,³ and 45 new coal power plants are in the pipeline (Tanner, 2017). As the fourth largest consumer and third biggest importer of coal in the world, Japan (along with China) also leads in financing international coal power developments (Trencher et al., 2019). This contrasts markedly with almost all member countries of the Organization of Economic Cooperation and Development (OECD), many of which have taken political action to phase out coal and achieve their emission reduction targets in line with the Paris Agreement.

The Japanese coal policy looks surprising not only due to the country's lack of fossil fuel reserves but also due to its substantial investments and expertise in alternative energy technologies. For

³ This figure is estimated to remain at a similar level by 2030. As a side note, Japan's emission reduction target in relation to the Paris climate agreement is a 26% reduction by 2030 (with 2013 as baseline).

example, Japanese firms are key market players in the domains of lithium ion batteries (for electricity storage) and carbon fibers (for wind turbines). Until the early 2000s, Japan was also a world leader in solar photovoltaic (PV) markets as a result of national promotion strategies such as the Sunshine Program (1974–) and the Alternative Energy Act (1980) (Cherp et al., 2017). Although the country has lost its leading position, Japan is still regarded as a global knowledge leader in solar PV technology (Binz et al., 2017; Cherp et al., 2017). Finally, it is notable that most firms listed in the Nikkei Japan 100 have business and procurement strategies leaning toward renewable energies (Tanner, 2017), thereby creating favorable conditions for technologies competing with coal. In spite of the strong knowledge base built up over decades, the Japanese energy sector has not capitalized on the country's advantages in renewable energies. On the contrary, the Japanese government has been promoting an expansion of coal-fired power plants (CCFPs) in both domestic and overseas markets through subsidies and public finance. Given that the typical lifetime of CCFPs spans several decades, these investments can possibly reinforce carbon lock-in not only in Japan but also in East Asia and Africa (Tanner, 2017).

The scene of coal policy-making in Japan has long been perceived as a closed club with actors from the legislature (particularly the Liberal Democratic Party), bureaucracy, and industry. Main pro-coal actors include the Ministry of Economy, Trade, and Industry (METI) (in charge of formulating the energy policies and strategies of the country), the Agency for Natural Resources and Energy (ANRE) (nested within METI), the Japan Business Federation (known as “Keidanren” in Japanese and having strong links to electric utilities and energy intensive industries), regional power utilities, and the Federation of Electric Power Companies. Moreover, the Japanese Government including the elected Prime Ministers and their cabinet, which determine policy priorities for the METI, have long been pro-coal. For the most part, Japan's energy policy is formulated through close cooperation among the triangle of the METI, Keidanren, and the government, whereas civil society actors have no strong say in such policy-making (Tanner, 2017; Trencher et al., 2019). Deliberative or advisory councils (known as *shingikai*) where non-government members discuss policy issues and provide recommendations have also played a major role in formulating energy policies (Kucharski and Unesaki, 2018).

Overall, the Japanese case is particularly interesting as it represents a *deviant case* (Gerring, 2017) in the sense that it is counterintuitive to the expectation that countries with no major domestic reserves and production are more likely to abandon the use of fossil fuels as opposed to countries not dependent on imports. Therefore, we expect the influence of interest groups to be particularly pronounced in the Japanese case and use our framework to explain why actors favoring coal power are more influential than those opposing it. Aside from the theoretical relevance, the insights from the Japanese case can also help to explain the coal policy of other consuming countries without notable domestic production such as South Korea or Malaysia. Furthermore, as one of the leading countries in financing and technology development of coal fired-power plants, gaining an insight into Japan's coal policy is also relevant for understanding the coal power developments especially in emerging economies.

5.2. Discerning institutional work practices and actor groups pertinent for the maintenance and destabilization of Japan's coal regime

We now apply our framework to derive the set of institutional work practices and mechanisms that can be pertinent for shaping the coal regime in the Japanese context. For that, we follow our

conceptualization of salience of practices in section 4.1 and thereby take into account the political system, issue characteristics and broader institutional context that apply to coal power in Japan. Based on section 4.3, we further contemplate on the contingencies among different practices and institutions in the Japanese context and finally, by considering the endowments required for these practices (section 4.2), we also address which actor groups may be better positioned in conducting them. As a result, by using the framework, we provide a detailed account of what may be an effective scheme of institutional work for disrupting or maintaining Japan's coal regime, which is illustrated in Fig. 2. These schemes can be viewed as testable propositions on agency-driven mechanisms of regime maintenance and destabilization that can be investigated in more detail in a full-fledged empirical study. In this paper, they are used as a theoretical benchmark to assess the strategies of regime actors and challengers (Section 5.3).

The politico-economic struggle around coal use is strongly linked to national energy and climate policies. In this context, regulative institutions such as laws and policies are expected to be the ultimate targets for both actors seeking to maintain the status quo and the ones aiming to disrupt it. As discussed in Section 4, apart from formal institutions, cognitive and normative dimensions can be important for creating legitimacy or challenging existing configurations too (Nilsson et al., 2011). For instance, pro-coal actors who benefit from current rules may create and sustain myths and theorize the benefits of coal-fired power to influence the cognitive frames of other actors. Opposing actors may then develop counter-narratives to contest these claims.

Depending on the political system, the significance of informal institutions as a means of influencing formal policy processes may also vary. For example, in consensual and open political systems, the alignment of formal and informal institutions may be more crucial for instigating a major change. This action may require suasion and deliberation among a larger number of societal and political leaders, leading to slower policy processes and incrementalism. For dominant coalitions in majoritarian or closed political systems like Japan, preceding work on normative and cognitive pillars may not be necessary to influence regulative institutions. Incumbents can induce drastic changes faster and subsequently work on influencing shared understandings and values to defend the regulative arrangements should any opposition arise (Schmidt, 2010). However, for actors lacking the formal decision-making power, such as the challengers not in favor of Japanese coal policy, a preceding work on informal institutions is necessary to delegitimize the strong position of incumbents that may be sensitive not only to coercive but also normative and mimetic pressures for adopting pro-environmental actions (Shah and Rivera, 2013). However, this may still not be sufficient to bring about disruptive policies such as a coal phase-out.

As explained in Section 4.3, timing and contingencies among different types of institutions can also be crucial factors. Cognitive institutions represent the prevalent perceptions on technologies (e.g., coal power) and cause-effect chains concerning the functioning of an environmental, social, or technical system. Hence, institutional work on this dimension may be less contentious than first targeting deeply held normative beliefs or interests vested in formal rules. This may be even more important in a technocratic policy setting such as Japan, where academics or consulting firms have greater access to advisory committees like the *shingikai* than NGOs or civil society groups (Tanner, 2017). In the Japanese case, practices on cognitive institutions, such as demonstration of lead market advantages for renewables, creation of a low-carbon energy vision and provision of scientific counterevidence to regime claims, may have greater leverage in inducing policy learning within dominant coalitions, especially among peripheral actors that may

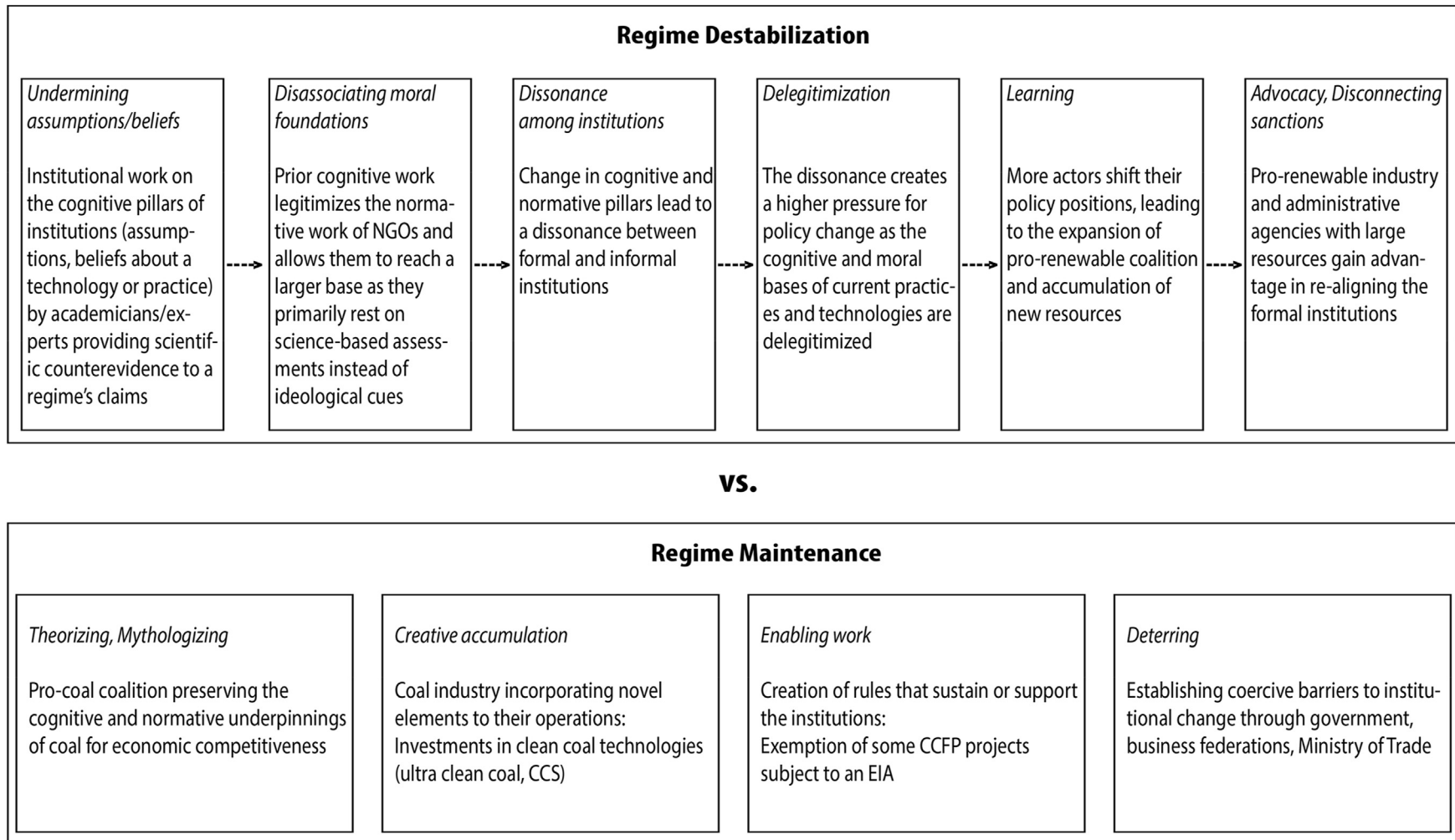


Fig. 2. Theorized schemes of institutional work practices and mechanisms pertinent for the destabilization and maintenance of Japan's coal regime.

have mixed or no clear policy preferences. In fact, some industrial and financial players, such as trading companies and plant manufacturers in Japan, have business interests in both coal and renewables. Shifting their attitude in favor of renewables can result in an expansion of pro-renewable coalition and an accumulation of new resources (Jenkins-Smith et al., 2018). The normative work of NGOs may gain larger traction when based on a prior “evidence-based” cognitive work of actor groups perceived as “credible” and “respectable,” such as academic institutions, business associations think-tanks instead of ideological references or values that are easier to dismiss. For instance, given the risk of stranded assets and potentially conflicting climate and energy policy targets, the appropriateness of issuing state subsidies and public finance assistance for CCFPs can be problematized more effectively when actors can draw upon studies or technical reports highlighting the growing global demand in renewable energy, the advanced knowledge base for renewables within Japan, and new business opportunities that can strengthen the global competitiveness of the Japanese industry. Finally, state actors such as the Ministry of the Environment and automotive and telecom industries as well as business associations like Japan Climate Leaders’ Partnership that have strong preferences for renewables (Tanner, 2017) may be in a better position, because of their bargaining power, to advocate for changes in policy instruments that can weaken the coal regime. These changes may include carbon price increase, removal of subsidies to overseas CCFP projects, stringent emission limits for planned and operating CCFPs, and changes in the legal threshold of the Environmental Impact Assessment (EIA) Law to broaden CCFP projects that are subject to stricter assessment.

As a result, to weaken the coal regime and eventually initiate a low-carbon energy transition, the pro-renewable coalition in Japan can seek disrupting institutions via three distinct forms of institutional work (Lawrence and Suddaby, 2006), each targeting a different dimension. Actors can engage in the act of *undermining assumptions and beliefs* to contest the dominant cognitive scheme constructed around coal as a reliable source of base load power that can be utilized in high-tech plants that are clean and climate friendly. As scientists have higher credibility, competence, and access to decision-makers in Japan, they may lead the role in problematizing the dependence on fossil fuels, creating visions and solutions with alternative technologies, and thus inducing learning and change in cognitive institutions. In fact, the recent trends in *shingikai* structure favoring the presence of outsiders, including academics, consulting firms, and journalists, over the insiders with vested interests can further enable this activity (Kucharski and Unesaki, 2018). Normative structures can be influenced by *disassociating moral foundations* concerning the subsidies and involvement of public finance institutions in the expansion of domestic and overseas coal power that might lead to overcapacity, stranded assets, and exacerbation of carbon lock-in. This move can be initiated by NGOs that may be better equipped with discursive and communicative skills in translating the cognitive work of scientists to the broader public. The alteration of cognitive and normative structures causes dissonance with formal institutions which can get increasingly disputable as their moral and cognitive bases are delegitimized. This can result in a shift of some organizations’ policy positions and thus the distribution of resources among different coalitions. Building on the leverage of prior institutional work and their disruptive impact, formal institutions can be targeted through *disconnecting sanctions*, the act of “working through state apparatus to disconnect rewards and sanctions from some set of practices, technologies or rules” (Lawrence and Suddaby, 2006, p. 235) that can be led by state actors and industrial and business associations with large financial resources and legitimacy for advocating changes in formal rules. This theorized

causal scheme of disruptive work is depicted in the top-half of Fig. 2.

In addition, the issue characteristics of coal power suggest that material and technological aspects are important as well. Given the interdependencies among different energy systems, including the positive externalities between battery technologies and solar PV (Bergek et al., 2015) and the convergence of electric vehicles and renewable electricity markets (Tanner, 2017), destabilization of the coal regime can also be induced indirectly by these technological jolts (de Leeuw and Gössling, 2016; Royston Greenwood, Suddaby and Hinings, 2002). Hence, fostering renewables through system-building activities, such as knowledge creation, experimentation, market formation, resource mobilization, and legitimation (Bergek et al., 2008; Hekkert et al., 2007) are important for demonstrating the viability of alternative technologies.

However, innovation can also be highly relevant for the preservation of the coal regime. Incumbents’ act of upgrading and incorporating new technologies and business plans, referred to as *creative accumulation*, can result in CCFPs with higher efficiency and better emission control technologies. These advancements contribute to the credibility of the clean coal narrative and thus strengthen the impact of *theorizing* and *mythologizing* pursued by the coal regime. In fact, the Ministry of Environment provides conditional support, provided that plants are equipped with next-generation technologies such as carbon capture and storage (CCS) or carbon capture and utilization (CCU) (Trencher et al., 2019). In addition to preserving cognitive and normative underpinnings, pro-coal actors can also pursue *enabling work* to implement or safeguard legislations that provide advantages to coal power production, such as the exemption of smaller plants from an EIA. Finally, by using their established networks in government and bureaucracy, regime actors can engage in *detering* to establish coercive barriers against regulative changes. This scheme of maintenance work is depicted in the bottom half of Fig. 2.

5.3. Toward uncovering the role of agency in Japanese coal lock-in

Considering that coal remains an important energy source in the long-term strategic plans of the Japanese government (the share of coal planned in the electricity mix for 2030 is 26%, a minimal reduction from the current figure of 28%) (ANRE, 2018) and a phase-out has not been on the policy agenda,⁴ the institutional work of pro-coal actors can be regarded as having prevailed so far. The empirical findings indicate that pro-coal actors indeed engage in almost all practices salient for the maintenance of a coal regime, such as *theorizing*, *mythologizing*, *enabling work*, and *creative accumulation*. Coal power is promoted by narratives claiming its compatibility with climate policy owing to the cleanliness and efficiency of coal technology in Japan, its economic superiority against the alternatives, and the reliability of the supply (Trencher et al., 2019). These cognitive frames set the rationale for the government’s support in R&D programs for advanced coal technologies, leading to the growth of intellectual capital and demonstration projects that provide empirical validity to pro-coal (Trencher et al., 2020). Hence, synergy is established in the institutional work of the regime as some of the practices, such as *theorizing*, *mythologizing*, and *creative accumulation*, appear to

⁴ At the time of this writing, Shinzo Abe who has been the prime minister since 2012 had resigned. The new prime minister Yoshihide Suga has recently announced Japan’s goal to become carbon neutral by 2050 (Source: <https://www.weforum.org/agenda/2020/10/japan-zero-emissions-carbon-neutral-society-2050/>). While this may signal major changes in energy strategy, it is too early to conclude whether Japan is on the verge of making a significant change in their coal policy and pursue a coal phase-out.

reinforce one another. As a result, the perception of clean coal gains wider traction not only among industry or government but also in the broader public. This enables pro-coal actors to face less pressure in pursuing their policy agendas.

Given that the prevalent cognitive frames play such a key role in fostering lock-in, their delegitimization is crucial for disrupting such reinforcing dynamics. Although NGOs and think-tanks have challenged the regime's narratives (Hakko and Lou, 2018; Takizawa, 2020), they struggle to achieve sufficient coverage in mainstream media (Trencher et al., 2020). While this deficiency may be due to inadequate endowments, namely, the networks and financial resources that can provide greater access to media outlets, as we posited in Section 5.2, NGOs' claims may also struggle in gaining credibility without the endorsement of reputable scientists, academic institutions, or actors with stronger agency, such as industry associations. In this regard, coalition building or forming green alliances is an important strategy for joining forces in the exchange of endowments and building reputation and capacities (Shah, 2011). Recently, two notable coalitions advocating decarbonization were formed, *Japan Climate Initiative* and *Japan Climate Leaders' Partnership*. The latter consists of only companies, while the former also includes city governments, NGOs, and research institutions. Although these coalitions raised their demands for a larger share of renewables in the electricity mix, they have not voiced any public dissent against coal power (Trencher et al., 2020). As a result, the normative and cognitive underpinnings of Japanese coal policy remained pretty much unscratched.

On the basis of the insights derived from the application of our framework to the Japanese context, we argue that disruptive work does not contain the right practices performed by the right actor groups. Owing to their intellectual capital and their reputation among decision-makers and the broader public, senior academicians and research institutes can be more effective than NGOs in providing counterevidence based on rigorous analyses and thus undermining prevalent assumptions and beliefs about the superiority of coal over alternative sources. Given the technocratic style of policy-making in Japan, they are also likely to have better access to policy arenas than civil society organizations. Although the structure of advisory committees long been acknowledged as biased toward interest groups, some outsider actors, such as academicians, are known to be better represented in these settings after the Fukushima disaster (Kucharski and Unesaki, 2018). Even in Canada where environmental groups against coal have been active since the 1980s, it was the active involvement of physicians in the early 2000s and their studies on the negative health impacts and cost-benefits of coal use that had the game-changing impact for phasing out coal in Ontario jurisdiction (Harris et al., 2015). Another lesson that can be drawn from the Ontario case is the formation of a broad coalition, Ontario Clean Air Alliance, which draws members from a variety of societal actors, including municipalities, unions, public health organizations, and utilities. Having recognized that the public is more sensitive to health concerns than to environmental issues, these actors run their media campaign by publicizing the Ontario Medical Association's studies on the health-related impacts of coal. This has led the disruptive narrative to resonate not only with the broader public but also with the government actors as it was harder to neglect or refute the evidence-based arguments put forward by credible scientists (Harris et al., 2015).

In the Japanese case, neither the scientists nor the newly founded coalitions such as the Japan Climate Initiative have yet to take the lead in delegitimizing the cognitive and normative underpinnings of the coal regime. As NGOs struggle to reach mainstream media, the disruptive work remains marginalized against the effective maintenance work of the coal regime. While the informal institutions are left largely intact, formal institutions are

also spared from notable disruption due to the lobbying power of regime actors and the established networks between incumbent industry and government. Even though pro-climate alliances consist of large companies favoring renewables, their influence on coal policy still remains limited because they do not directly target coal power and they lack support from heavy industry, such as the automotive, power, and steel sectors (Trencher et al., 2020). As a result, the coal regime is able to persist, making Japan the only G7 country that plans to construct new coal plants despite lacking domestic reserves.

We do not claim that our account of agency is the sole factor explaining this outcome. However, our study reveals a notable difference between the effectiveness of institutional work targeting maintenance versus disruption of the coal regime in Japan. Plus, the fact that coal lock-in is supposed to be a less likely outcome in an industrialized nation like Japan that lacks domestic coal reserves and possesses expertise in alternative energy technologies increases the significance of the effectiveness of institutional work practices as an explanatory factor. Therefore, we argue that agency can play a crucial role in determining the status of socio-technical regimes as in the example of Japan's coal power and recommend further studies to explicitly study institutional contestations and actors' strategies and practices therein. The theoretical and empirical insights suggest that articulating an effective institutional work requires attentiveness to institutional context, contingencies among different adversaries' practices, and coordination with allies in sharing information and endowments. Moreover, actors should be vigilant in counteracting the actions of adversary groups and seizing windows of opportunities presented by external events (Herweg et al., 2018). We argue that actors better at managing this complexity are more influential in translating their interests and beliefs into institutional structures, such as laws and policies. In order to assess in depth the institutional work of actors with respect to these aspects, longitudinal and process-based approaches can be used (Beach and Pedersen, 2019). Reputational measures (Fischer and Sciarini, 2015) are also relevant for formally eliciting the influence of an actor or determining how competently a given practice is conducted. Researchers can rely on surveys, interviews, and gray literature for collecting data on actors' practices and endowments.

6. Concluding remarks: Contributions and application field of the EPI framework

The purposeful destabilization of incumbent socio-technical regimes such as fossil-fuel based energy supplies is crucial for sustainability transitions. Despite increasing attention from scholars to study how incumbent regimes decline or persist, the role of agency remains less researched. We believe an explicit focus on how actors actively pursue disrupting or maintaining regimes complements existing studies in terms of understanding why destabilization is observed in some cases and not in others.

For example, it is difficult to explain the current trends in coal phase-out solely by the politico-economic characteristics of countries. Among the frontrunners are countries with a long history of domestic coal production and abundant reserves, such as Canada and the United Kingdom. On the other hand, some wealthy countries with an advanced manufacturing sector, high R&D spending, and innovation capacity, such as Japan and South Korea, are yet to break away from coal lock-in even though they lack domestic coal reserves and production. To better account for such counterintuitive patterns, we need to analyze the contestations on the formal and informal institutions that underpin these regimes and explain why some actors are more influential in translating their interest and beliefs into formal institutions, such as policies that shape the

trajectories of low-carbon transitions.

The Endowment-Practice-Institutions (EPI) Framework developed in this paper helps tackling this challenge. By using the framework, researchers can assess the salience of actors' practices and endowments to unravel why some actors are more influential in shaping institutional structures. As a result, the framework can shed light on the characteristics of institutional work effective for disrupting and maintaining socio-technical regimes. A systematic application of this framework over a number of cases can elucidate how such patterns vary with institutional settings and thus yield generalizable insights into the agency-driven mechanisms of regime destabilization or resistance. This will not only be of theoretical but also practical relevance for initiating sustainability transitions.

By integrating complementary insights from Political Economy and New Institutionalism, the EPI framework also contributes to these fields of study. First, it enhances the Political Economy perspective by elucidating the set of practices functioning as micro-level mechanisms in the translation of actors' endowments to their policy goal attainment. Likewise, it extends the theoretical scope of the institutional work approach by explicating endowments that enable actors' practices and proposing ways through which institutional structures condition the salience of institutional work practices. The framework also theorizes what makes institutional work "effective" and thereby enables the progression from descriptive accounts of institutional work practices towards more explanatory research that elucidates, for instance, why certain actors engage in particular practices and why some are more influential in shaping institutional arrangements. Overall, the EPI framework provides new theoretical insights and research avenues in systematically studying agency and its role in institutional outcomes defining socio-technical regimes.

CRediT authorship contribution statement

Appendix Table 1

Similarities and overlaps among endowments tied to policy goal attainment, classification of institutional work practices according to its means, and the conceptualization used in this framework.

Categories of endowments associated with the policy goal attainment in Political Economy	Classification of the means of successful institutional work (Hampel et al., 2017)	Conceptualization of endowments conducive to institutional work practices (as used in EPI Framework)
Financial assets	Material and technological artefacts (to conduct <i>material work</i>)	Resources <ul style="list-style-type: none"> - Material resources (financial assets, physical, technological artefacts) - Non-material resources (political and judicial expertise)
Organizational capacity <ul style="list-style-type: none"> - Mobilization of motivational and material resources 	Skills of using signs, language, and identities (to conduct <i>symbolic work</i>)	Discourses <ul style="list-style-type: none"> - Narratives, frames generated to influence collective meaning systems, and public opinion.
Conflict capacity <ul style="list-style-type: none"> - "Systemic relevance" strengthens the bargaining position of actors and creates (re)electoral pressure through structural power 	Interaction with other actors (<i>relational work</i>)	Social Networks <ul style="list-style-type: none"> - Relational ties and position of actors in the networks
Networks <ul style="list-style-type: none"> - Position of actors within a network 		

Mert Duygan: Conceptualization, Formal analysis, Investigation, Writing – original draft, Writing – review & editing, Visualization, Funding acquisition. **Aya Kachi:** Writing – original draft, Writing – review & editing, Supervision, Funding acquisition. **Thiago D. Oliveira:** Writing – review & editing. **Adrian Rinscheid:** Writing – original draft, Writing – review & editing, Funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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APPENDIX

The conceptualization by Duygan et al. (2019), which we adopt in this framework, has some overlaps with what Political Economy literature offers (see table below). Apart from the financial assets and networks that are common, organizational and conflict capacity can be argued to depend on the non-material resources and discourses of actors. The conceptualization is also in close alignment with the classification of institutional work based on their means as material, relational, and symbolic (Hampel et al., 2017). While material work is said to draw on physical artefacts and technologies, relational work refers to one's interaction with other actors, and institutional work of symbolic nature is considered to rely on the use of signs, language, and identities. Thus, we argue that resources are likely to be the primary means for enabling material work, whereas networks are relevant for relational work, and discourses for symbolic work.

References

- ANRE, 2018. Fifth basic energy strategy. Available from: https://www.enecho.meti.go.jp/en/category/others/basic_plan/5th/pdf/strategic_energy_plan.pdf.
- Baumgartner, F.R., Larsen-Price, H.A., Leech, B.L., Rutledge, P., 2011. Congressional and presidential effects on the demand for lobbying. *Polit. Res. Q.* 64 (1), 3–16. <https://doi.org/10.1177/1065912909343578>.
- Beach, D., Pedersen, R.B., 2019. *Process-Tracing Methods: Foundations and Guidelines*. University of Michigan Press.
- Bergek, A., Berggren, C., Magnusson, T., Hobday, M., 2013. Technological discontinuities and the challenge for incumbent firms: destruction, disruption or

- creative accumulation? *Res. Pol.* 42 (6–7), 1210–1224. <https://doi.org/10.1016/J.RESPOL.2013.02.009>.
- Bergek, A., Hekkert, M., Jacobsson, S., Markard, J., Sandén, B., Truffer, B., 2015. Technological innovation systems in contexts: conceptualizing contextual structures and interaction dynamics. *Environ. Innov. Soc. Transit.* 16, 51–64. <https://doi.org/10.1016/j.eist.2015.07.003>.
- Bergek, A., Jacobsson, S., Carlsson, B., Lindmark, S., Rickne, A., 2008. Analyzing the functional dynamics of technological innovation systems: a scheme of analysis. *Res. Pol.* 37 (3), 407–429. <https://doi.org/10.1016/J.RESPOL.2007.12.003>.
- Berggren, C., Magnusson, T., Sushandoyo, D., 2015. Transition pathways revisited: established firms as multi-level actors in the heavy vehicle industry. *Res. Pol.* 44 (5), 1017–1028. <https://doi.org/10.1016/j.respol.2014.11.009>.
- Berry, S., 1989. Social institutions and access to resources. *Africa: J. Int. Afr. Inst.* 59 (1), 41–55. <https://doi.org/10.2307/1160762>.
- Binderkrantz, A., 2008. Different groups, different strategies: how interest groups pursue their political ambitions. *Scand. Polit. Stud.* 31 (2), 173–200. <https://doi.org/10.1111/j.1467-9477.2008.00201.x>.
- Binderkrantz, A.S., Pedersen, H.H., 2016. What is access? A discussion of the definition and measurement of interest group access. *Eur. Polit.* Retrieved from <http://link.springer.com/article/10.1057/eps.2016.17>.
- Binz, C., Harris-Lovett, S., Kiparsky, M., Sedlak, D.L., Truffer, B., 2016. The thorny road to technology legitimization — institutional work for potable water reuse in California. *Technol. Forecast. Soc. Change* 103, 249–263. <https://doi.org/10.1016/j.techfore.2015.10.005>.
- Binz, C., Tang, T., Huenteler, J., 2017. Spatial lifecycles of cleantech industries — the global development history of solar photovoltaics. *Energy Pol.* 101, 386–402. <https://doi.org/10.1016/J.ENPOL.2016.10.034>.
- Box-Steffensmeier, J.M., Christenson, D.P., Hitt, M.P., 2013. Quality over quantity: amici influence and judicial decision making. *Am. Polit. Sci. Rev.* 107 (3), 446–460. <https://doi.org/10.1017/S000305541300021X>.
- Cherp, A., Vinichenko, V., Jewell, J., Suzuki, M., Antal, M., 2017. Comparing electricity transitions: a historical analysis of nuclear, wind and solar power in Germany and Japan. *Energy Pol.* 101.
- Culpepper, P.D., 2011. *Quiet Politics and Business Power: Corporate Control in Europe and Japan*. Cambridge University Press, Cambridge.
- Dai, X., 2005. April 17). Why comply? The domestic constituency mechanism. *Int. Organ.* 59, 363–398. <https://doi.org/10.1017/S0020818305050125>.
- Davidson, D.J., 2019. Ennovating for a renewable energy transition. *Nat. Energy*. <https://doi.org/10.1038/s41560-019-0369-3>.
- de Leeuw, T., Gössling, T., 2016. Theorizing change revisited: an amended process model of institutional innovations and changes in institutional fields. *J. Clean. Prod.* 135, 435–448. <https://doi.org/10.1016/j.jclepro.2016.06.119>.
- Dür, A., 2008. Measuring interest group influence in the EU. *Eur. Union Polit.* 9 (4), 559–576. <https://doi.org/10.1177/1465116508095151>.
- Duygan, M., Stauffacher, M., Meylan, G., 2019. A heuristic for conceptualizing and uncovering the determinants of agency in socio-technical transitions. *Environ. Innov. Soc. Transit.* 33, 13–29. <https://doi.org/10.1016/j.eist.2019.02.002>.
- Duygan, M., Stauffacher, M., Meylan, G., 2021. What constitutes agency? Determinants of actors' influence on formal institutions in Swiss waste management. *Technol. Forecast. Soc. Change* 162. <https://doi.org/10.1016/j.techfore.2020.120413>.
- Fischer, M., Sciarini, P., 2015. Unpacking reputational power: intended and unintended determinants of the assessment of actors' power. *Soc. Network.* 42, 60–71. <https://doi.org/10.1016/J.SOCNET.2015.02.008>.
- Fuenfschilling, L., Binz, C., 2018. Global socio-technical regimes. *Res. Pol.* 47 (4), 735–749. <https://doi.org/10.1016/J.RESPOL.2018.02.003>.
- Fuenfschilling, L., Truffer, B., 2014. The structuration of socio-technical regimes—conceptual foundations from institutional theory. *Res. Pol.* 43 (4), 772–791. <https://doi.org/10.1016/J.RESPOL.2013.10.010>.
- Garud, R., Hardy, C., Maguire, S., 2007. Institutional entrepreneurship as embedded agency: an introduction to the special issue. *Organ. Stud.* 28 (7), 957–969. <https://doi.org/10.1177/0170840607078958>.
- Geels, F., 2004. Understanding system innovations: a critical literature review and a conceptual synthesis. In: Elzen, B., Geels, F.W., Green, K. (Eds.), *System Innovation and the Transition to Sustainability: Theory, Evidence and Policy*. Edward Elgar Publishing, pp. 19–47.
- Geels, F., 2005. The dynamics of transitions in socio-technical systems: a multi-level analysis of the transition pathway from horse-drawn carriages to automobiles (1860–1930). *Technol. Anal. Strat. Manag.* 17 (4), 445–476. <https://doi.org/10.1080/09537320500357319>.
- Geels, F., 2011. The multi-level perspective on sustainability transitions: responses to seven criticisms. *Environ. Innov. Soc. Transit.* 1, 24–40. <https://doi.org/10.1016/j.eist.2011.02.002>.
- Geels, F.W., 2014. Regime resistance against low-carbon transitions: introducing politics and power into the multi-level perspective. *Theor. Cult. Soc.* 31 (5), 21–40. <https://doi.org/10.1177/0263276414531627>.
- Gerring, J., 2017. *Case Study Research: Principles and Practices*, second ed. Cambridge University Press.
- Greenwood, Royston, Suddaby, R., Hinings, C.R., 2002. Theorizing change: the role of professional associations in the transformation of institutionalized fields. *Acad. Manag. J.* 45 (1), 58–80. <https://doi.org/10.2307/3069285>.
- Grødem, A.S., Hippe, J.M., 2019. Networking, lobbying and bargaining for pensions: trade union power in the Norwegian pension reform. *J. Publ. Pol.* 39 (3), 465–481. <https://doi.org/10.1017/S0143814X18000144>.
- Guillemette, M.G., Mignerat, M., Paré, G., 2017. The role of institutional work in the transformation of the IT function: a longitudinal case study in the healthcare sector. *Inf. Manag.* 54 (3), 349–363. <https://doi.org/10.1016/J.IM.2016.09.003>.
- Hacker, J.S., Pierson, P., 2014. After the “master theory”: downs, schattschneider, and the rebirth of policy-focused analysis. *Perspect. Polit.* 12 (3), 643–662. <https://doi.org/10.1017/S1537592714001637>.
- Hakko, H., Lou, M., 2018. Uncertain and harmful: Japanese coal investments in Indonesia. Available at: <https://www.greenpeace.org/japan/sustainable/publication/2018/12/06/6544/>.
- Hall, R.L., Deardorff, A.V., 2006. Lobbying as legislative subsidy. *Am. Polit. Sci. Rev.* 100 (1), 69–84. <https://doi.org/10.1017/S0003055406062010>.
- Haller, T., 2007. *Understanding Institutions and Their Links to Resource Management from the Perspective of New Institutionalism*, second ed. NCCR North-South, Bern, Switzerland. [2002]. NCCR North-South Dialogue 2.
- Hampel, C.E., Lawrence, T.B., Tracey, P., 2017. Institutional work: taking stock and making it matter. In: Greenwood, Royston, Oliver, C., Lawrence, T.B., Meyer, R.E. (Eds.), *The SAGE Handbook of Organizational Institutionalism*, second ed. SAGE Publications Ltd, pp. 558–591.
- Hardy, C., Maguire, S., 2017. Institutional entrepreneurship and change in fields. In: Greenwood, R., Oliver, C., Lawrence, T.B., Meyer, R.E. (Eds.), *The SAGE Handbook of Organizational Institutionalism*, second ed. SAGE Publications, London, pp. 261–280.
- Harris, M., Beck, M., Gerasimchuk, I., 2015. The End of Coal: Ontario's coal phase-out. Accessible at: <https://www.iisd.org/library/end-coal-ontarios-coal-phase-out>.
- Hekkert, M.P., Suurs, R.A.A., Negro, S.O., Kuhlmann, S., Smits, R.E.H.M., 2007. Functions of innovation systems: a new approach for analysing technological change. *Technol. Forecast. Soc. Change* 74 (4), 413–432. <https://doi.org/10.1016/J.TECHFORE.2006.03.002>.
- Helpman, E., Persson, T., 2001. Lobbying and legislative bargaining. *B E J. Econ. Anal. Pol.* 1 (1) <https://doi.org/10.2202/1538-0637.1008>.
- Herweg, N., Zahariadis, N., Zohnhöfer, R., 2018. The multiple streams framework: foundations, refinements, and empirical applications. In: Weible, C.M., Sabatier, P. (Eds.), *Theories of the Policy Process*, fourth ed. Westview Press, pp. 17–54.
- Hess, D.J., 2016. The politics of niche-regime conflicts: distributed solar energy in the United States. *Environ. Innov. Soc. Transit.* 19, 42–50. <https://doi.org/10.1016/j.eist.2015.09.002>.
- Hillman, A.J., Hitt, M.A., 1999. Corporate political strategy formulation: a model of approach, participation, and strategy decisions. *Acad. Manag. Rev.* 24 (4), 825–842.
- Hinings, C.R., Logue, D., Ziestma, C., 2017. Fields, institutional infrastructure and governance. In: Greenwood, R., Oliver, C., Lawrence, T.B., Meyer, R.E. (Eds.), *The SAGE Handbook of Organizational Institutionalism*, second ed. SAGE Publications, London, pp. 163–189.
- Jenkins-Smith, H.C., Nohrstedt, D., Weible, C.M., Ingold, K., 2018. The advocacy coalition framework: an overview of the research program. In: Weible, C.M., Sabatier, P. (Eds.), *Theories of the Policy Process*, fourth ed. Westview Press, pp. 135–172.
- Kivimaa, P., Kern, F., 2016. Creative destruction or mere niche support? Innovation policy mixes for sustainability transitions. *Res. Pol.* 45 (1), 205–217. <https://doi.org/10.1016/J.RESPOL.2015.09.008>.
- Korpi, W., 1985. Power resources approach vs. Action and conflict: on causal and intentional explanations in the study of power. *Socio. Theor.* 3 (2), 31–45.
- Kucharski, J.B., Unesaki, H., 2018. An institutional analysis of the Japanese energy transition. *Environ. Innov. Soc. Transit.* 29, 126–143. <https://doi.org/10.1016/j.eist.2018.07.004>.
- Kungl, G., Geels, F.W., 2018. Sequence and alignment of external pressures in industry destabilisation: understanding the downfall of incumbent utilities in the German energy transition (1998–2015). *Environ. Innov. Soc. Transit.* 26, 78–100. <https://doi.org/10.1016/j.eist.2017.05.003>.
- Lawrence, T.B., Leca, B., 2009. Introduction: theorizing and studying institutional work. In: Lawrence, T.B., Suddaby, R., Leca, B. (Eds.), *Institutional Work: Actors and Agency in Institutional Studies of Organizations*. Cambridge University Press, pp. 1–27.
- Lawrence, T.B., Suddaby, R., 2006. Institutions and institutional work. In: Clegg, S., Hardy, C., Lawrence, T., Nord, W. (Eds.), *Handbook of Organization Studies*. SAGE, pp. 215–254.
- Leach, M., Mearns, R., Scoones, I., 1999. Environmental entitlements: dynamics and institutions in community-based natural resource management. *World Dev.* 27 (2), 225–247. [https://doi.org/10.1016/S0305-750X\(98\)00141-7](https://doi.org/10.1016/S0305-750X(98)00141-7).
- Leipprand, A., Flachsland, C., 2018. Regime destabilization in energy transitions: the German debate on the future of coal. *Energy Res. & Social Sci.* 40, 190–204. <https://doi.org/10.1016/j.erss.2018.02.004>.
- Levy, D.L., Egan, D., 1998. Capital contests: national and transnational channels of corporate influence on the climate change negotiations. *Polit. Soc.* 26 (3), 337–361. <https://doi.org/10.1080/089373233>.
- Levy, D., Scully, M., 2007. The institutional entrepreneur as modern prince: the strategic face of power in contested fields. *Organ. Stud.* 28 (7), 971–991. <https://doi.org/10.1177/0170840607078109>.
- Maguire, S., Hardy, C., 2006. The emergence of new global institutions: a discursive perspective. *Organ. Stud.* 27 (1), 7–29. <https://doi.org/10.1177/0170840606061807>.
- Martínez Arranz, A., 2017. Lessons from the past for sustainability transitions? A meta-analysis of socio-technical studies. *Global Environ. Change* 44, 125–143. <https://doi.org/10.1016/j.gloenvcha.2017.03.007>.

- Mazzucato, M., 2013. *The Entrepreneurial State: Debunking Public vs. Private Sector Myths*. Anthem Press.
- Munir, K.A., 2005. The social construction of events: a study of institutional change in the photographic field. *Organ. Stud.* 26 (1), 93–112. <https://doi.org/10.1177/0170840605049463>.
- Nilsson, M., Nilsson, L.J., Hildingsson, R., Stripple, J., Eikeland, P.O., 2011. The missing link: bringing institutions and politics into energy future studies. *Futures* 43 (10), 1117–1128. <https://doi.org/10.1016/j.futures.2011.07.010>.
- Offe, C., Wiesenthal, H., 1980. Two logics of collective action: theoretical notes on social class and organizational form. *Polit. Power Soc. Theor.* 1 (1), 67–115.
- Offe, Claus, 2003. *Herausforderungen der Demokratie: zur Integrations- und Leistungsfähigkeit politischer Institutionen* (Frankfurt a.M./New York: Campus).
- Pelzer, P., Frenken, K., Boon, W., 2019. Institutional entrepreneurship in the platform economy: how Uber tried (and failed) to change the Dutch taxi law. *Environ. Innov. Soc. Transit.* <https://doi.org/10.1016/j.eist.2019.02.003>.
- Penna, C.C.R., Geels, F.W., 2015. Climate change and the slow reorientation of the American car industry (1979–2012): an application and extension of the Dialectic Issue LifeCycle (DILC) model. *Res. Pol.* 44 (5), 1029–1048. <https://doi.org/10.1016/j.respol.2014.11.010>.
- Perkmann, M., Spicer, A., 2008. How are management fashions institutionalized? The role of institutional work. *Hum. Relat.* 61 (6), 811–844. <https://doi.org/10.1177/0018726708092406>.
- Rinscheid, A., Eberlein, B., Emmenegger, P., Schneider, V., 2019. Why do junctures become critical? Political discourse, agency, and joint belief shifts in comparative perspective. *Regul. & Govern.* <https://doi.org/10.1111/rego.12238>, 0(0).
- Roberts, J.C.D., 2017. Discursive destabilisation of socio-technical regimes: negative storylines and the discursive vulnerability of historical American railroads. *Energy Res. & Social Sci.* 31, 86–99. <https://doi.org/10.1016/j.erss.2017.05.031>.
- Rogge, K.S., Johnstone, P., 2017. Exploring the role of phase-out policies for low-carbon energy transitions: the case of the German Energiewende. *Energy Res. & Social Sci.* 33, 128–137. <https://doi.org/10.1016/j.erss.2017.10.004>.
- Rosenbloom, D., Rinscheid, A., 2020. Deliberate decline: an emerging frontier for the study and practice of decarbonization. *WIREs Clim. Change* 11 (6), e669. <https://doi.org/10.1002/wcc.669>.
- Schlager, E., 2007. A comparison of frameworks, theories, and models of policy processes. In: Sabatier, P. (Ed.), *Theories of the Policy Process*, second ed. Westview Press, pp. 293–319.
- Schmidt, V.A., 2010. Taking ideas and discourse seriously: explaining change through discursive institutionalism as the fourth 'new institutionalism'. *Eur. Polit. Sci. Rev.* 2 (1), 1–25. <https://doi.org/10.1017/S175577390999021X>.
- Scott, W.R., 2008. *Institutions and Organizations: Ideas and Interests*, third ed. SAGE Publications, Los Angeles.
- Selznick, P., 1949. *TVA and the Grass Roots: A Study of Politics and Organization*. University of California Press.
- Sewell, W.H., 1992. A theory of structure: duality, agency, and transformation. *Am. J. Sociol.* 98 (1), 1–29. Retrieved from. <http://www.jstor.org/stable/2781191>.
- Shah, K.U., 2011. Organizational legitimacy and the strategic bridging ability of green alliances. *Bus. Strat. Environ.* 20 (8), 498–511. <https://doi.org/10.1002/bse.706>.
- Shah, K.U., Rivera, J.E., 2013. Do industry associations influence corporate environmentalism in developing countries? Evidence from Trinidad and Tobago. *Pol. Sci.* 46 (1), 39–62. <https://doi.org/10.1007/s11077-012-9162-x>.
- Stigler, G.J., 1971. The theory of economic regulation. *Bell J. Econ. Manag. Sci.* 2 (1), 3–21.
- Suddaby, R., Seidl, D., Lê, J.K., 2013. Strategy-as-practice meets neo-institutional theory. *Strat. Organ.* 11 (3), 329–344. <https://doi.org/10.1177/1476127013497618>.
- Takizawa, H., 2020. 5 fallacies of Japan's coal-fired power export policy. Available at: https://www.renewable-ei.org/pdfdownload/activities/202003_coalexinfo_EN.pdf.
- Tanner, D., 2017. Japan's Energy Choices towards 2020: How its Shift to Coal Is Misaligned with the Strategic Interests of Japan Inc. Influence Map. https://influencemap.org/site/data/000/302/Japan_Report_October_2017.pdf. Accessed date: 15 March 2019.
- Trencher, G., Healy, N., Hasegawa, K., Asuka, J., 2019. Discursive resistance to phasing out coal-fired electricity: narratives in Japan's coal regime. *Energy Pol.* 132, 782–796. <https://doi.org/10.1016/j.enpol.2019.06.020>. October 2018.
- Trencher, G., Rinscheid, A., Duygan, M., Truong, N., Asuka, J., 2020. Revisiting carbon lock-in in energy systems: explaining the perpetuation of coal power in Japan. *Energy Res. & Social Sci.* 69.
- Turnheim, B., Geels, F.W., 2012. Regime destabilisation as the flipside of energy transitions: lessons from the history of the British coal industry (1913–1997). *Energy Pol.* 50, 35–49. <https://doi.org/10.1016/j.enpol.2012.04.060>.
- Turnheim, B., Sovacool, B.K., 2019. Forever stuck in old ways? Pluralising incumbencies in sustainability transitions. *Environ. Innov. Soc. Transit.* <https://doi.org/10.1016/j.eist.2019.10.012>.
- Unruh, G.C., 2000. Understanding carbon lock-in. *Energy Pol.* 28 (12), 817–830. [https://doi.org/10.1016/S0301-4215\(00\)00070-7](https://doi.org/10.1016/S0301-4215(00)00070-7).
- van Asselt, M.B.A., Vos, E., 2006. The precautionary principle and the uncertainty paradox. *J. Risk Res.* 9 (4), 313–336. <https://doi.org/10.1080/13669870500175063>.
- Varone, F., Ingold, K.M., Jourdain, C., 2016. Studying policy advocacy through social network analysis. *Eur. Polit. Sci.* 1–15. <https://doi.org/10.1057/eps.2016.16> preview.
- Walker, E.T., Rea, C.M., 2014. The political mobilization of firms and industries. *Annu. Rev. Sociol.* 40, 281–304. <https://doi.org/10.1146/annurev-soc-071913-043215>.
- Wooten, M., Hoffman, A.J., 2017. Organizational fields: past, present and future. In: Greenwood, R., Oliver, C., Lawrence, T.B., Meyer, R.E. (Eds.), *The SAGE Handbook of Organizational Institutionalism*, second ed. SAGE Publications, London, pp. 55–74.
- Wright, C., Nyberg, D., 2014. Creative self-destruction: corporate responses to climate change as political myths. *Environ. Polit.* 23 (2), 205–223. <https://doi.org/10.1080/09644016.2013.867175>.
- Zvolaska, L., Voytenko Palgan, Y., Mont, O., 2019. How do sharing organisations create and disrupt institutions? Towards a framework for institutional work in the sharing economy. *J. Clean. Prod.* 219, 667–676. <https://doi.org/10.1016/j.jclepro.2019.02.057>.